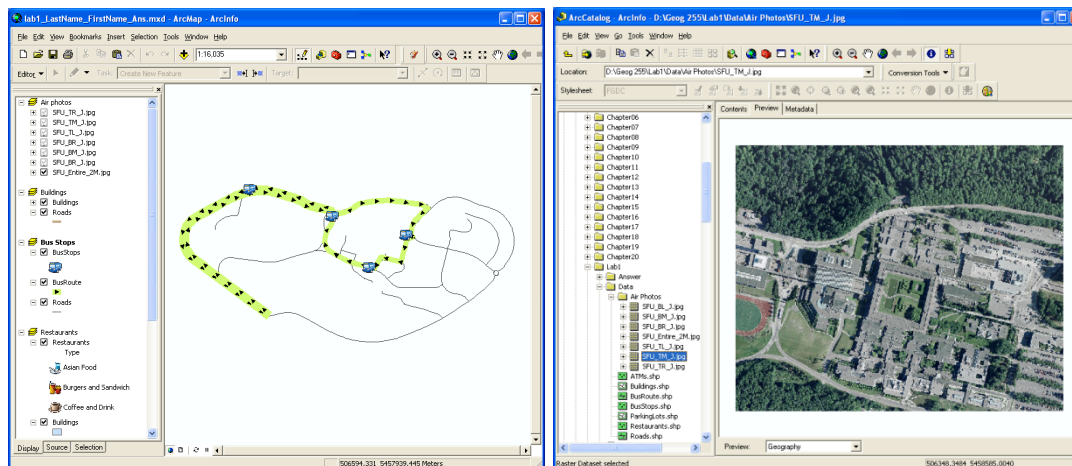


LAB1: Getting Started ArcGIS Desktop

lab date January 12, 2010 - In Lab
due date January 26, 2010 - In Lab
deliverables • Answer sheet
 • ArcMap document (.mxd)
 • Hard copy ArcMap Layout view

I. Introduction

In GEOG 255 labs, you will learn to use GIS software called *ESRI ArcGIS Desktop* which is one of the most commonly used software packages among GIS users. *ESRI ArcGIS Desktop* has two major applications; *ArcMap* (left) and *ArcCatalog*(right).



GEOG 255 has five main labs for this semester and each lab is composed of two sections; a tutorial and assignment section.

In the **tutorial section**, you need to follow directions of the user manual, *Getting to know ArcGIS Desktop: ESRI press*. While doing the tutorial section, you will be asked to answer some questions to evaluate whether you fully understand the instructions. In the **assignment section**, you may be asked to do your own project using the knowledge obtained from the tutorial section and GEOG 255 lectures.

The labs will not only teach you how to use the ESRI ArcGIS Desktop applications, but also will reinforce the concepts covered in the lectures. When you work through the tutorial or assignment section, examine every step by displaying the result. If the result is different

from what you expect, rethink what you are doing and check if you are on the right track. It is strongly recommended to read the lab handout completely BEFORE starting the tutorial and the assignment.

Here's the useful links. You may have to refer some online web pages to answer questions.

- ESRI ArcGIS Desktop 9.3 online Help (HTML format):
<http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?TopicName=welcome>
- ESRI ArcGIS Desktop 9.3 Help (inside program): *Help > ArcGIS Desktop Help* (menu)
- ESRI Resource Centre: <http://resources.esri.com>
- Lab materials and data folder: *My Computer >> S: Drive >> Geog 255-Data*
- GIS data for your project: *My Computer >> S: Drive >> Data Warehouse*
- Homework hand-in folder: *My Computer >> S: Drive >> Homework >> Geog255*

II. Data download and Assignment submission

This *Data download and assignment submission procedure* is applied to this and all future labs.

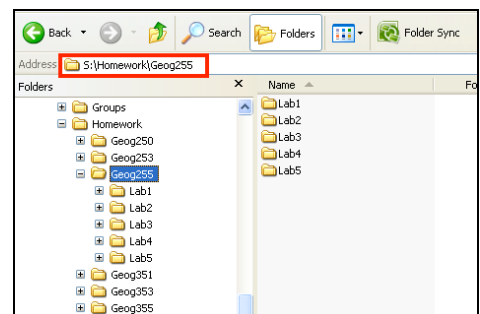
First, log on with your SIS account and password. If there is any problem regarding your SIS log on, contact a SIS lab administrator.

Second, double click *My Computer* icon from the desktop and go to *D:\Temp* folder.

Third, delete all existing files and folders from *D:\Temp*. Copy appropriate data from *S:* drive and paste them into *D:\Temp* which is your working space. If you are not sure how to copy data from *S:* drive, contact a SIS lab administrator or your TA.

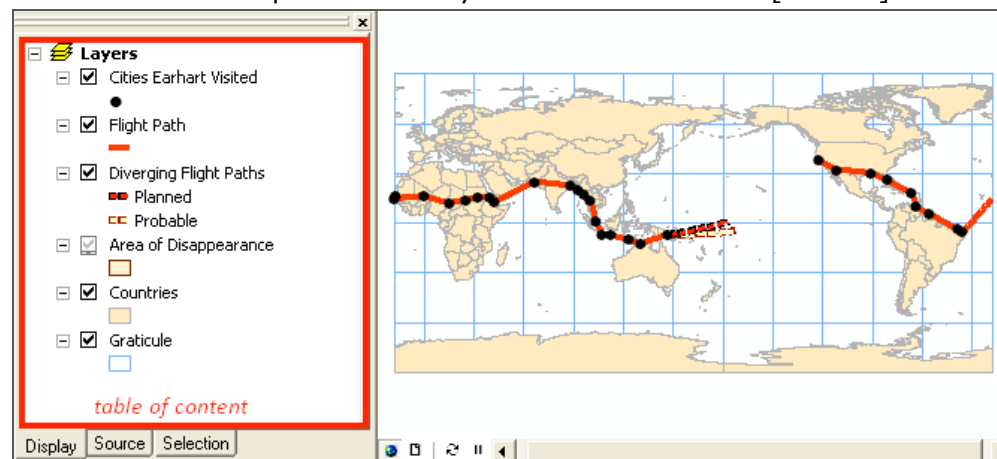
Fourth, after finishing your work, backup everything you need into your personal USB memory stick or *H:* drive. Make sure any data left in *D:\Temp* folder may be deleted by next users.

Lastly, if you are requested to submit digital format assignments, copy your final output into *S:\Homework\Geog255\Labxx* folder. You do have a *write* permission, but not a *Modify* permission; it means that you can upload your file into the Homework folder but you CANNOT delete the file once the file is uploaded. To delete the file from the Homework folder, contact a SIS administrator.



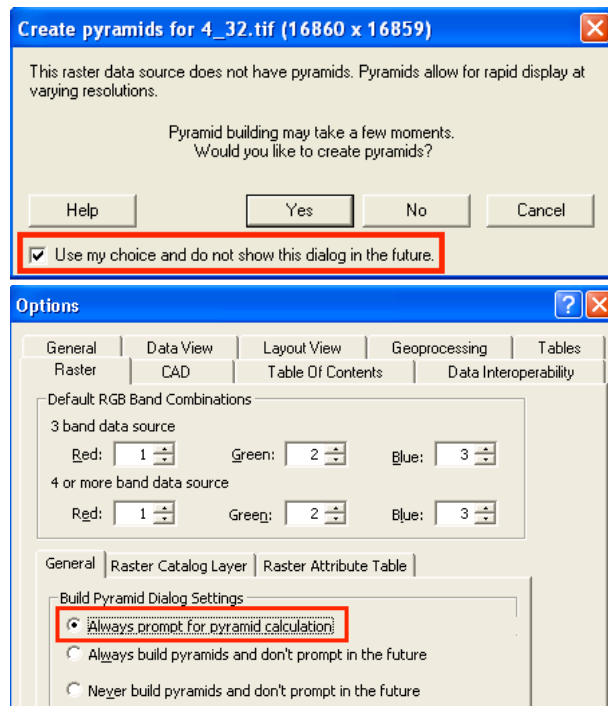
III. Tutorial Instruction [Total: 12.5 marks]

- 1) Work through *Getting to Know ArcGIS Desktop* chapter 3 [Exploring ArcMap]
 - a. [Exercise 3a, step 19] Make sure *<Top-most layer>* is selected from *Identify from* option. Click *Caripito* city. Select *<All layers>* from *Identify from* lists of *Identify* tool. Click *Caripito* city again. Describe the differences of these two scenarios. [1 mark]
 - b. [Exercise 3b, step 1] You might have discovered that *The Area of Disappearance* layer was shown in the *table of contents* with a grayed-out check mark which was different from other layers. Explain why the layer is shown differently from other layers in the *table of contents*. You will find the answer of this question once you finish Exercise 3b. [1 mark]



- c. [Exercise 3c, step 15] What is the minimum, maximum and mean value of elevation for 27 cities? [1 mark]
- 2) Work through *Getting to Know ArcGIS Desktop* chapter 5 [Symbolizing features and rasters]
 - a. [Exercise 5c, step 18] Close all ArcMap documents if opened. Open the layer file you created in step 15 in this exercise by double clicking the layer file (*Animals.lyr*) from Windows Explorer. After the layer file is opened, add *Animals.shp* file on the current ArcMap document using *Add* button (📁). Describe how these layers (layer from *Animals.lyr* and layer from *Animals.shp*) look differently. [1 mark]. From this example, describe the benefits when you save a *shapefile* as a layer format (*.lyr*). You can refer ArcGIS 9.3 online if needed.[1 mark]

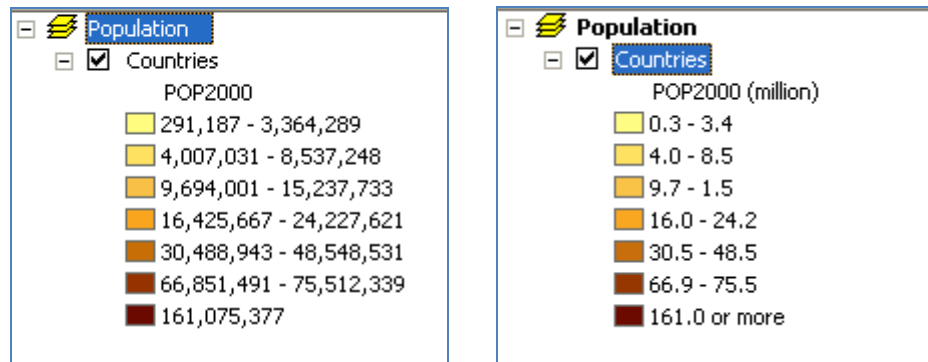
- b. [Exercise 5d, step 4] When you add a raster file, a pop up window titled *Create pyramids* will be displayed. If you click *Use my choice and ...* check box, you will not get this window when you open a raster file later. If you want to open this window again, go to *Option >> Raster* tab from the main ArcMap menu and select *Always prompt for pyramid calculation* option.



When you add a raster file with *Pyramid* option (clicking *Yes* button), a new file would be created. Identify the file type (extension) of the new created file. [0.5 mark] Describe the functionalities of *Pyramid* files. *ArcGIS 9.3 Online help* would be a good source to answer this question [1 mark].

3) Work through *Getting to Know ArcGIS Desktop* chapter 6 [Classifying features and rasters]

- a. [Exercise 6a, step 21] Sometimes, people prefer simple labels (lower right image) than complex ones (lower left image). Change the label of *Countries* layer in the *table of content* to be as simple as possible (it should still be meaningful) similar to the image below (right) and describe how you edited the label. [0.5 mark]. Once the label editing is done, copy your label displayed in the *table of content* using Windows print screen and Paint program and paste it in your answer sheet. [0.5 mark]. Ask your TA, if you are not sure how to use *Windows Print Screen* and *Paint* program.



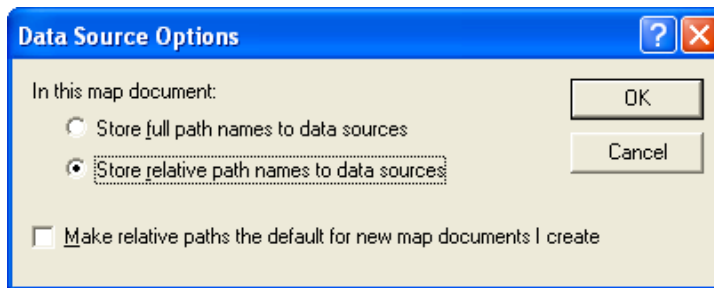
- b. [Exercise 6d, step 23] Right click on the *Rivers* layer in *Rivers* frame and select *copy*. Right click on the *Power* frame and select *paste* in order to insert the *Rivers* layer into this *Power* frame. Drag the *Rivers* layer below to and above the *Countries* layer.
- (1) Describe how these two layers are displayed in each case (when *Rivers* layer is under or above the *Countries* layer). [1 mark].
 - (2) Copy your *Data View* using Windows Print Screen and paste it into your answer sheet [1 mark].
 - (3) Interpretation of GIS analyst output is quite important. Take a close look at the output of this exercise and describe how the source of electrical power is related to the distribution of rivers in northern, central and southern Africa using the map (screen shot image) you created in (2). Describe it with your own words. [1 mark].

- 4) Work through *Getting to Know ArcGIS Desktop* chapter 7 [Labeling features]
- a. [Exercise 7b, step 3] Click *Scale Range* button from *Layer Properties*. Describe the functionality of the button. [1 mark]

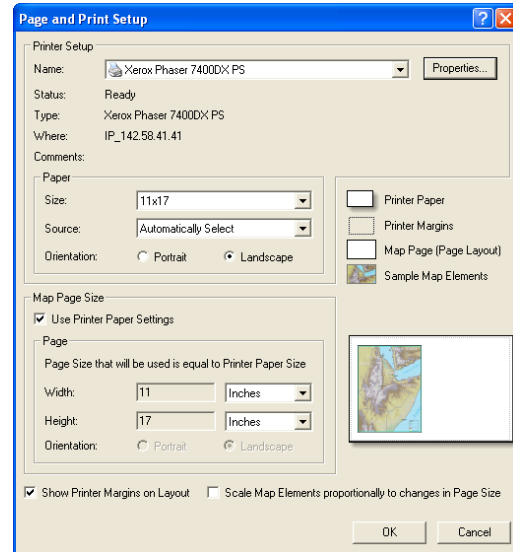
IV. Assignments Instruction [Total: 25 marks]

In this assignment, you will create a Simon Fraser University thematic map. The map will have six frames; *Air Photos*, *Buildings*, *Restaurants*, *Bus Stops*, *ATMs*, and *Parking Lots*. An ArcMap document file, *Lab1_LastName_FirstName.mxd*, will be given to you. This document already contains *Air Photos*, *Buildings* and *Bus Stops* frame. Make sure features' attribute information and their geographic values are correct. You will edit or create features' attribute values and geographic locations in lab5.

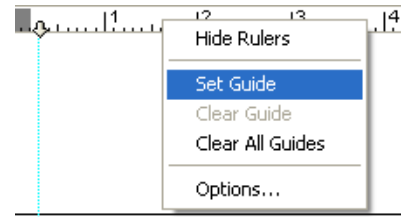
- 1) Go to *File>>Document Property* from ArcMap main menu and press *Data Source Options* button. Select *Store relative path names to data sources selection from Data Source Options* if needed. For more information regarding to saving data with relative path, refer the following link:
http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?id=205&pid=197&topicname=Referencing_data_in_the_map. Describe the benefit to use this relative path option. [1 mark]

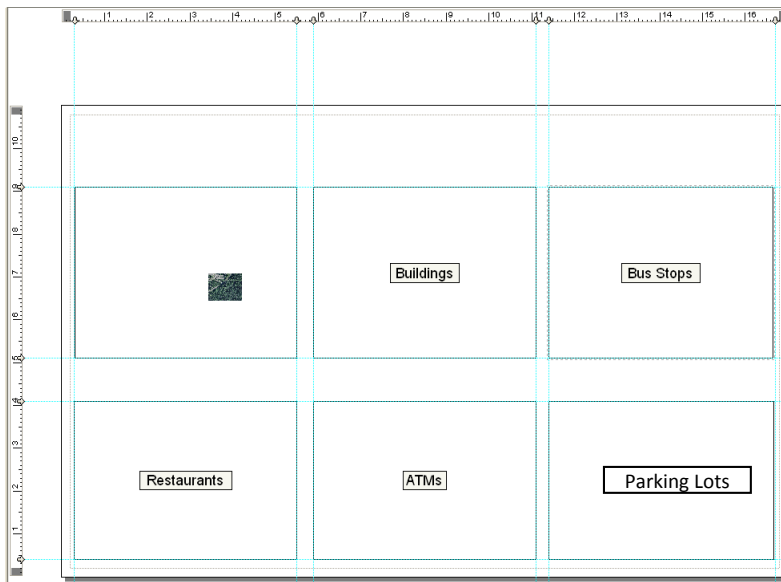


- 2) Describe why SFU_BM_J.jpg raster image is not displayed in the given ArcMap document. [1 mark]
- 3) Insert three more frames into the given ArcMap document and rename the frames as *Restaurants*, *ATMs* and *Parking Lots*.
- 4) Go to *File>>Print Setup* from the main menu. Select *Xerox Phaser 7400DX PS* printer and change *Paper Size* to 11x17 from *Page and Print Setup*.

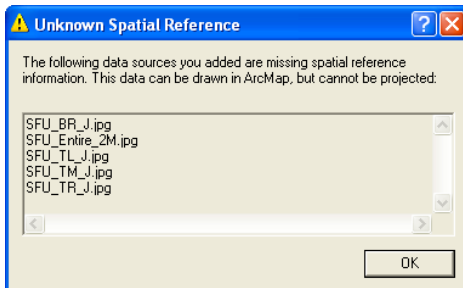


- 5) Change the current view from *Data view* to *Layout view*. Evenly distribute six frames and change their size. It would be much easier to add six vertical and four horizontal guide lines (cyan colored lines in the image below) before changing their size. You can insert guide lines by right clicking on the ruler and selecting *Set Guide*. Ask your TA if it is not still clear how to insert guide lines.

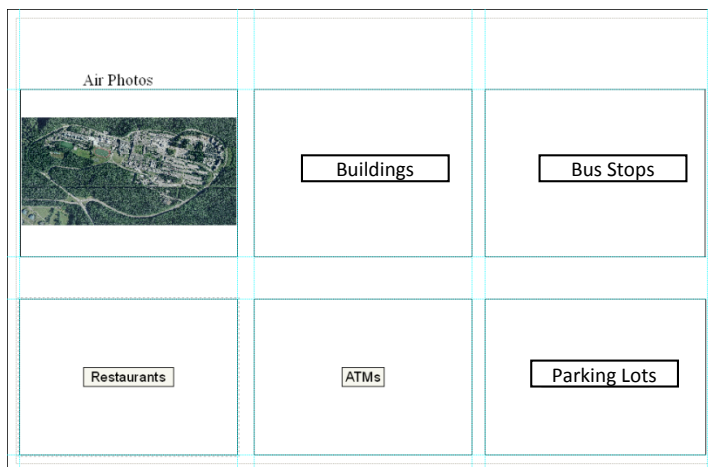




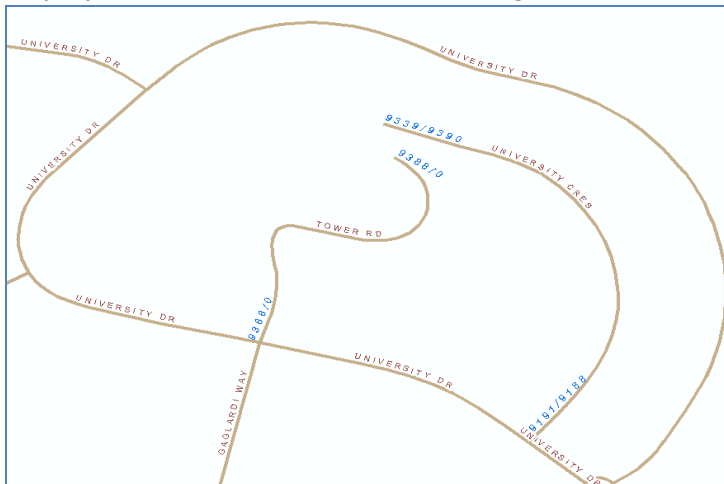
- 6) Switch back to *Data View* and activate Air Photos frame. Add rest of five jpg files into this frame. When you add images, you may get this warning message mentioning these images are not spatilly referenced. Ignore this warning message now.



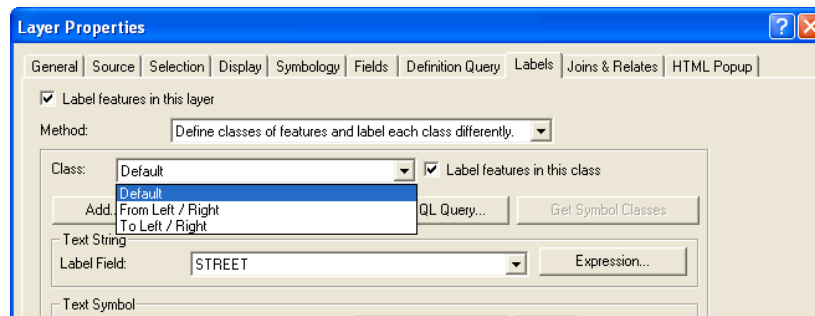
- 7) Now you have five raster layers in this current frame. *SFU_Entire_2M.jpg* covers entire SFU and rest six images cover Top Right (*SFU_TR_J.jpg*), Top Middle (*TM*), Top Left (*TL*), Bottom Right (*BR*), Bottom Middle (*BM*), and Bottom Right (*BR*) part of SFU. Change each layer's property in order that the map does not display *SFU_Entire_2M.jpg* layer and only display other six layers when the scale of this map is equal to or greater than 1:3,000 and the vice versa. [2 marks]
- 8) **Switch** to *Layout View* and make these raster images cover entire SFU within the left top frame. Add a title (*Air Photos*) using *Title* or *Text* functionality above the frame. Change its font properties to be matched with others. [1 mark]



- 9) Activate *Buildings* frame and add *Roads.shp* feature class. Change its symbol and display its labels as similar to the image below.

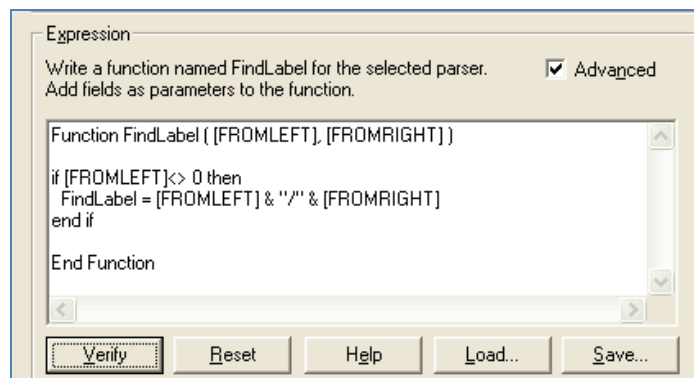


- Open *Symbol Selector* add *Transportation Symbol* by pressing *More Symbols* button and choose *A30* for *Roads* feature class. Change its *width* to 3.00. [0.5 mark]
- Open *Layer Properties* and go to *Display* tab. Change its *Transparency* from *Layer Properties* to 50%. [0.5 mark]
- Open *Layer Properties* if needed and go to *Labels* tab. Choose *Define classes of features and labels each class differently from Method*. Add two more classes on top of *Default* class and rename them as *From Left / Right* and *To Left / Right*. *Default* class will display *STREET* field. Change its *Placement Properties* and *Symbol* if needed. Its color, font, font size should be similar to the labels of the image above. [1 mark]
- Click *Symbol* button >>*Properties*>>*Mask* tab and select *Holo* in order that the *STREET* label is not hidden by other features. [0.5 mark]



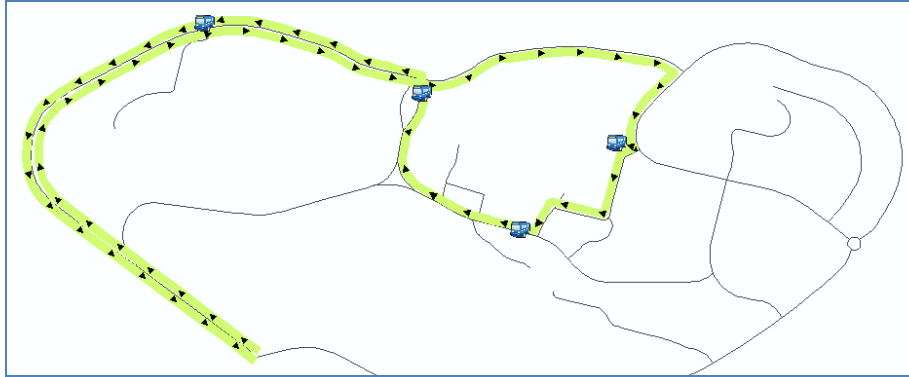
- e. *From Left / Right* class will display *FROMLEFT* and *FROMRIGHT* fields at the same time. After selecting *From Left/ Right* class, press *Expression* button. Type the VBA code as same as the text box below. You will learn what each line means in the later part of this course. Press *Verify* button and make sure there is no syntax error. If no error found, press *OK* button. Change *Placement Properties*, *Scale Range*, *Label Styles*, and *Symbol*. This label should not display if this map is zoomed out to 1:4,000 or more. Make sure its color, font, font size and label position should be similar to the labels of the image above. Once you are satisfied with the *FROM Left / Right* class label, apply this process to *To Left / Right* class. [3 marks]

```
Function FindLabel ( [FROMLEFT], [FROMRIGHT] )  
  
if [FROMLEFT] <> 0 then  
    FindLabel = [FROMLEFT] & "/" & [FROMRIGHT]  
end if  
  
End Function
```

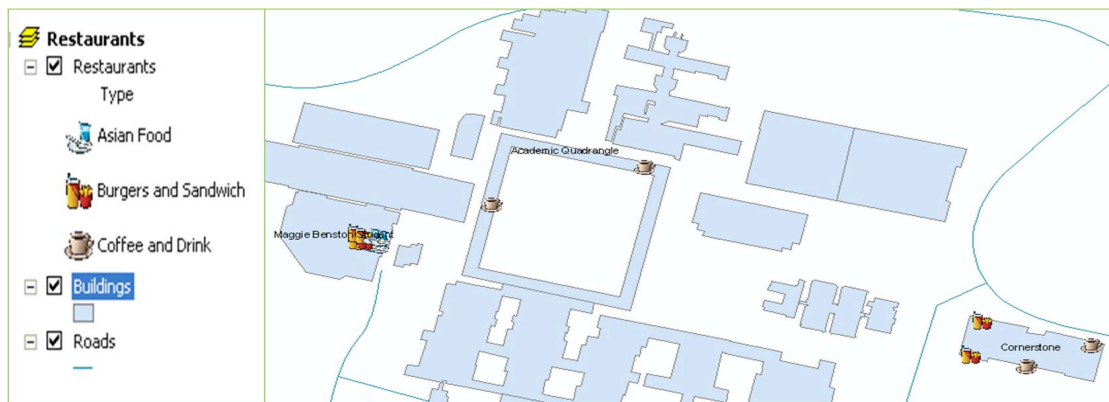


- f. Add *Building.shp* feature class above *Roads* layer. Display label with *Build_Name* field only when this layer is zoomed in 1:3,000 or more. Set up other label properties such as font, color, font size as you want. [1 mark]

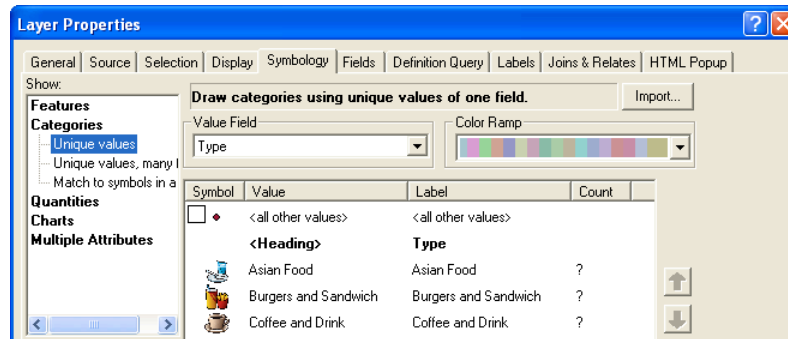
- g. Switch to *Layout View* and zoom in and/or out to the *Buildings* layers fit to the top middle frame. Add a *Text* as *Buildings* and change its properties if needed. [1 mark]
- 10) Activate *Bus Stops* frame and add *Roads.shp*, *BusRoutes.shp* and *BusStops.shp* feature classes. Change its symbol and display its labels as similar as the image below.



- a. For *Bus Stops* layer, change its symbol same as the one in the image above. You may have to add symbol package by pressing More Symbols button from the Symbol Selector. [1 mark]
- b. For *Bus Route* layer, change its symbol same as the one in the image above. You can choose any color, but the symbol must have arrows inside the line symbols and the direction of the arrows should be correct. [1 mark]
- c. Switch to *Layout View* and zoom in and/or out to the *Bus Stops* layers fit to the top right frame. Add an appropriate text and change its properties if needed. [1 mark]
- 11) Activate *Restaurants* frame and add *Roads.shp*, *Buildings.shp* and *Restaurants.shp* feature classes. Change its symbol and display its labels as similar as the image below.



- h. For *Restaurants* layer, go to *Symbology* tab from Layer Properties and choose *Unique values* from *Categories*. Choose *Type* field for *Value Field*.



- a. Choose different appropriate symbols for each *Type* categories. Your symbols could be different from those in the image above but should be meaningful. [1 mark]
- b. For *Buildings* layer, display only features whose *Build_Name* is one of *Cornerstone*, *Academic Quadrangle*, *Maggie Benston Student*. You may have to use VBA code which you used in 8 e). A part of VBA code is provided with you. You only need to edit one *italic* font line simply. [2 mark]

```
Function FindLabel ( [Build_Name] )
    if [Build_Name] = _____ then
        FindLabel = [Build_Name]
    end if
End Function
```

- c. *Layout View* and zoom in and/or out *Restaurants* layers to 1:5,000. Add an appropriate text and change its properties if needed. [1 mark]

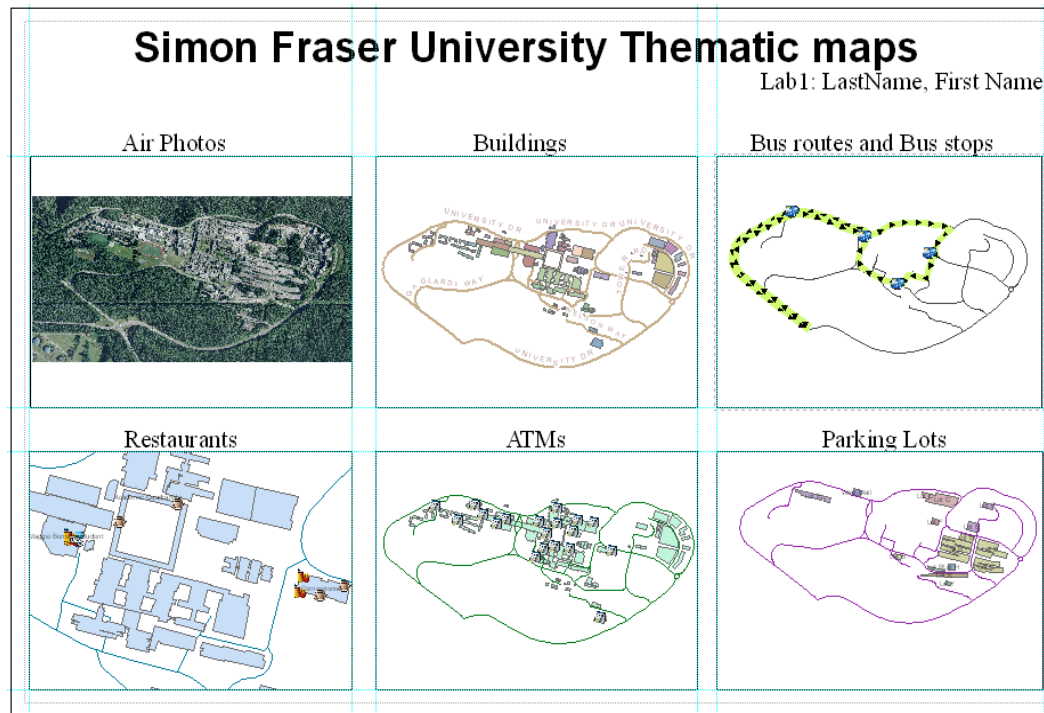
12) Activate *ATMs* frame from *Data View* and add *Roads.shp*, *ATMs.shp* and *Buildings.shp* feature classes. Change its symbol and display its labels satisfying following criteria.

- a. For *ATMs* layer, change its label scale range in order that the label only displays when the layer is zoomed in 1:5,000 or detail. The color of *ATMs* layer and that of *Buildings* layer should be different. [0.5 mark]
- b. For *Buildings* layer, change its label scale range in order that the label only displays when the layer is zoomed in 1:5,000 or detail. [0.5 mark]
- c. Switch to *Layout View* and zoom in and/or out *ATMs* layer fit to the bottom middle frame. Add an appropriate text and change its properties if needed. [0.5 mark]

13) Activate *Parking Lots* frame from *Data View* and add *Roads.shp*, *ParkingLots.shp* feature classes. Change its symbol and display its labels satisfying following criteria.

- For *Parking Lots* layer, display its label with *Name* filed. Also, change its symbol with *Unique Values* with *Name* field. [0.5 mark]
- Switch to *Layout View* and zoom in and/or out *Parking Lots* layer fit to the bottom right frame. Add an appropriate text and change its properties if needed. [0.5 mark]

14) Your final output for lab1 should be similar to the image below.



- Add an appropriate Title of the map.
- Add an appropriate text with *Lab1: LastName, FirstName*.
- Print your final output with 11x17 size, color. The *Page and Print Setup* should be set same as the image below. Before printing the output in color, it is strongly recommended to print it in *Black and White*. This may save your print credit. You can set color option by choosing *Properties* (from *Page and Print Setup*) >> *Color Options* >> *Office Color* >> *Black and White*. Once you are satisfied with your final output, submit it to your TA. [3 marks]
- Save your ArcMap document as *lab1_LastName_FirstName.mxd* and submit this mxd file only. You don't need to submit any data file. The mxd document should open without any error in TA's computer. [0.5 mark]

